

**DEPARTMENT OF ENVIRONMENTAL QUALITY
PERMITTING and COMPLIANCE DIVISION
MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM
(MPDES)**

Fact Sheet

PERMITTEE: PPL Montana, LLC

PERMIT NUMBER: MT0023167

RECEIVING WATER: Madison River

FACILITY INFORMATION:

Name: Madison Hydro-Electric Station (HES)

Location: 950 Ennis Lake Road
Ennis, MT 59729-9014

Mailing Address: 45 Basin Creek Road
Butte, MT 59701

Contact: Frank Pickett, Aquatic Ecologist
Telephone: (406) 533-3445

FEE INFORMATION:

Number of Outfalls: 2 (for fee determination purposes)

Type of Outfall: 002 – Private/minor
003 – Private/minor

I. Permit Status

The previous Montana Pollutant Discharge Elimination System (MPDES) permit covered three discharges, one from each of the three Montana Power Company Madison Dam facility package wastewater treatment plants. It was issued November 8, 1995, became effective January 1, 1996. On April 29, 1999, the Department acknowledged the receipt of notification for transfer of ownership of the Madison Dam facility and permit to PPL Montana, LLC for the Madison Hydro-Electric Station (HES). The permit expired midnight, November 30, 2000. In accordance with ARM 17.30.1313(1)(b), the permit was administratively extended. Additional information (updated application forms DEQ-1 and 2E) was submitted at the Department's request on November 21, 2007.

II. Facility Information

A. Facility Description

Montana PPL, LLC owns and operates the Madison Hydro-Electric Station (HES), located northeast of Ennis, Montana, on the Madison River. The permittee has requested coverage for two outfalls (Outfalls 002 and 003), one for each of the two Sequencing Batch Reactor (SBR) treatment systems that serve single-family employee housing units on site. Previously permitted Outfall 001 for the wastewater generated by employees at the power house has been eliminated and that wastewater is now pumped and hauled by a septic hauler.

For each discharge, treatment is supplied by an International Wastewater System SBR with a design flow of 1,000 gallons per day (gpd). In the case of Outfall 002, domestic wastewater from the house is collected in a 1,500 gallon aerated tank that is level control-released to the SBR for treatment. Periodic discharge occurs from a pipe on the east bank at a point approximately 200 feet upstream of the river return flow at the Powerhouse. For Outfall 003, domestic wastewater from the residence is treated by the SBR and batch discharged to the Madison River slack water approximately 50 feet upstream of the dam proper. Discharge is from a pipe on the east bank above the water level. There are no disinfection capabilities for either outfall.

125%

Sludge is removed from the system on a yearly schedule by a local septic hauler. The permittee does not currently have authorization for coverage under EPA Region VIII Permit Number MTG650000, General Permit for Facilities/Operations that Generate, Treat, and/or Use/Dispose of Sewage Sludge by Means of Land Application, Landfill, and Surface Disposal Under the National Pollutant Discharge Elimination System.

Table 1 is a summary of the International Wastewater System SBR design criteria from the operation and maintenance manual.

Table 1. Current Design Criteria for the IWS SBR Package Plants, Outfalls 002 and 003

Facility Description: Two Sequencing Batch Reactor package plants, batch discharge with no disinfection capabilities.	
Construction Date: 1999	Modification Date: NA
Design Year: 2019	
Design Population: 10	Population Served: single family, 2 fulltime residents
Design Flow, Average (mgd): 0.001	Design Flow, Peak (mgd): Unknown
Minimum Retention Time (hrs): Unknown	
Design BOD Removal (%): Unknown	Design BOD Load (lb/day): Unknown
Design SS Removal (%): Unknown	Design SS Load (lb/day): Unknown
Design TN Removal (%): Unknown	Design TN Load (lb/day): Unknown
Design TP Removal (%): Unknown	Design TP Load (lb/day): Unknown
Collection System: Combined [<input type="checkbox"/>] Separate [<input checked="" type="checkbox"/>]	
SSO Events (Y/N): No	Number: 0
Bypass Events: No	Number: 0
Inflow and Infiltration contribution (mgd): not quantified	Source: Dam raw water from drains and sumps
Disinfection: No	Type: none
Discharge Method: Daily batch releases	
Effluent Flow Primary Device: None, use volumetric calculations	
Effluent Secondary Flow Device: None, use volumetric calculations	
Sludge Storage: None	
Sludge Disposal: Annual	EPA Authorization Number: None

B. Effluent Characteristics

Effluent data for Outfalls 002 and 003 are from the permittee Discharge Monitoring Reports (DMR) for the Period of Record (POR) January 2003 through August 2007 and are summarized in Tables 2 and 3, respectively. Total Nitrogen (TN), total ammonia as N, and Total Phosphorus as P (TP) with applicable flow data were obtained from September 1995 through February 1997 DMRs for both Outfalls as no more current data is available.

Table 2: Outfall 002 DMR Effluent Characteristics⁽¹⁾ for January 2003 through August 2007

Parameter	Location	Units	Previous Permit Limit (7-d/30-d)	Minimum Value	Maximum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	gpd	-- ⁽²⁾	12	248	69	56
Biochemical Oxygen Demand (BOD ₅)	Influent	mg/L	-- ⁽³⁾	--	--	--	0
	Effluent	mg/L	45/30	<1	22	5.5	56
	Effluent	% removal	85 ⁽³⁾	--	--	--	0
	Effluent	lb/day	0.3 ⁽⁵⁾	<0.001	0.028	0.004	56
Total Suspended Solids (TSS)	Influent	mg/L	-- ⁽³⁾	--	--	--	0
	Effluent	mg/L	45/30	2	22	6	56
	Effluent	% removal	85 ⁽³⁾	--	--	--	0
	Effluent	lb/day	0.3 ⁽⁵⁾	<0.001	0.015	0.003	56
Fecal Coliform Bacteria ⁽⁶⁾	Effluent	Number per 100 mL	-- ⁽³⁾	--	--	--	0
pH minimum (median value)	Effluent	s.u.	6.0 to 9.0	6.8	8.2	7.6	56
pH maximum (median value)	Effluent	s.u.	6.0 to 9.0	7.1	8.9	7.7	56
Temperature	Effluent	°C	-- ⁽³⁾	--	--	--	0
Total Residual Chlorine ⁽⁷⁾	Effluent	mg/L	-- ⁽³⁾	--	--	--	0
Total Ammonia as N	Effluent	mg/L	-- ⁽²⁾	0.80	12.6	3.9	18
Total Kjeldahl Nitrogen	Effluent	mg/L	-- ⁽²⁾	1.9	35.7	7.8	18
Nitrate + Nitrite as N	Effluent	mg/L	-- ⁽²⁾	<0.05	13.7	3.1	18
Total Nitrogen ⁽⁸⁾	Effluent	mg/L	-- ⁽²⁾	2.27	38.6	10.8	18
		lb/day	0.4 ⁽⁵⁾	0.006	0.22	0.055	18
Total Phosphorus as P	Effluent	mg/L	-- ⁽²⁾	1.39	11.3	6.22	18
		lb/day	0.1 ⁽⁵⁾	0.007	0.049	0.022	18
Dissolved Oxygen	Effluent	mg/L	-- ⁽³⁾	--	--	--	0
Oil and Grease	Effluent	mg/L	-- ⁽³⁾	--	--	--	0
Total Dissolved Solids	Effluent	mg/L	-- ⁽³⁾	--	--	--	0

Footnotes:

- (1) Conventional and Non-conventional Pollutants only, table does not include information on toxic pollutants.
- (2) No effluent limit in previous permits, monitoring requirement only.
- (3) No limit or monitoring requirement in previous permit.
- (4) Effluent limit, no monitoring requirement in previous permit.
- (5) Nondegradation Annual Average Load Value, not permit limitation.
- (6) Sample period is April 1 through October 31.
- (7) Instantaneous/Daily Maximum Value.
- (8) Calculated as the sum of TKN and Nitrite + Nitrate-N concentrations.

Table 3: Outfall 003 DMR Effluent Characteristics⁽¹⁾ for January 2003 through August 2007

Parameter	Location	Units	Previous Permit Limit (7-d/30-d)	Minimum Value	Maximum Value	Average Value	Number of Samples
Flow, Daily Average	Effluent	gpd	-- ⁽²⁾	63.3	535	149	55
Biochemical Oxygen Demand (BOD ₅)	Influent	mg/L	-- ⁽³⁾	--	--	--	0
	Effluent	mg/L	45/30				55
	Effluent	% removal	85 ⁽³⁾	--	--	--	0
	Effluent	lb/day	0.2 ⁽⁵⁾	<0.001	0.043	0.01	55
Total Suspended Solids (TSS)	Influent	mg/L	-- ⁽³⁾	--	--	--	0
	Effluent	mg/L	45/30	2	43	8	55
	Effluent	% removal	85 ⁽³⁾	--	--	--	0
	Effluent	lb/day	0.2 ⁽⁵⁾	0.001	0.062	0.011	55
Fecal Coliform Bacteria ⁽⁶⁾	Effluent	Number per 100 mL	-- ⁽³⁾	--	--	--	0
pH minimum (median value)	Effluent	s.u.	6.0 to 9.0	6.9	8.3	7.6	55
pH maximum (median value)	Effluent	s.u.	6.0 to 9.0	7.4	8.4	8.0	55
Temperature	Effluent	°C	-- ⁽³⁾	--	--	--	0
Total Residual Chlorine ⁽⁷⁾	Effluent	mg/L	-- ⁽³⁾	--	--	--	0
Total Ammonia as N	Effluent	mg/L	-- ⁽²⁾	<0.10	6.4	1.7	18
Total Kjeldahl Nitrogen	Effluent	mg/L	-- ⁽²⁾	0.20	13.7	4	18
Nitrate + Nitrite as N	Effluent	mg/L	-- ⁽²⁾	0.06	23.2	8	18
Total Nitrogen ⁽⁸⁾	Effluent	mg/L	-- ⁽²⁾	2.7	26.2	12	18
		lb/day	0.2 ⁽⁵⁾	0.002	0.07	0.02	18
Total Phosphorus as P	Effluent	mg/L	-- ⁽²⁾	1.82	7.18	4.02	18
		lb/day	0.1 ⁽⁵⁾	0.001	0.03	0.01	18
Dissolved Oxygen	Effluent	mg/L	-- ⁽³⁾	--	--	--	0
Oil and Grease	Effluent	mg/L	-- ⁽³⁾	--	--	--	0
Total Dissolved Solids	Effluent	mg/L	-- ⁽³⁾	--	--	--	0

Footnotes:

- (1) Conventional and Non-conventional Pollutants only, table does not include information on toxic pollutants.
- (2) No effluent limit in previous permits, monitoring requirement only.
- (3) No limit or monitoring requirement in previous permit.
- (4) Effluent limit, no monitoring requirement in previous permit.
- (5) Nondegradation Annual Average Load Value, not permit limitation.
- (6) Sample period is April 1 through October 31.
- (7) Instantaneous/Daily Maximum Value.
- (8) Calculated as the sum of TKN and Nitrite + Nitrate-N concentrations.

Review of the POR data for both outfalls shows that there were no exceedences of effluent limitations. The permittee has been in compliance with permit conditions as noted during Department inspections conducted in November 2006 and October 2007.

III. Proposed Technology-based Effluent Limits (TBELs)

A. Applicability

The Board of Environmental Review has adopted by reference 40 CFR 133 which sets minimum treatment requirements for secondary treatment or equivalent for publicly owned treatment works [ARM 17.30.1209]. National Secondary Standards (NSS) as described in 40 CFR 133, are incorporated into applicable discharge permits. Secondary treatment is defined in terms of effluent quality as measured by BOD₅, TSS, percent removal of BOD₅ and TSS, and pH.

The regulations in 40 CFR 133.105 allow for the application of treatment equivalent-to-secondary effluent limitations (TES) to facilities that meet specific criteria. To qualify for treatment equivalent-to-secondary (TES), the facility must use either a trickling filter or waste stabilization pond as the principle process of treatment as stated in 40 CFR 133.101(g)(2) and the treatment works must also provide significant biological treatment of the wastewater [40 CFR 133.101(g)(3)]. Significant biological treatment is defined as aerobic or anaerobic treatment that consistently achieves 65% removal of BOD₅ [40 CFR 133.101(k)]. The IWS SBRs are activated sludge package plants and hence do not qualify for consideration for TES.

NSS limitations have been applied to the discharges at Outfalls 002 and 003 in previous permit cycles and will remain in effect for this permit cycle with the exception of the percent removal criteria. Previously, the permittee was not required to monitor the BOD₅ or TSS percent removal criteria although the 85% removal limitations were applied to these discharges. The SBR treatment systems each serve single-family dwellings. Variability in influent characteristics is dependent on the number of people in residence and visitors at the homes. With the currently engineered installations, adequate mixing of the influent for representative sampling is problematic for Outfall 002 and not feasible for Outfall 003.

Both discharges are small compared with the receiving water flow (design flows to dilution flow ratios are over 470,000), the SBRs are operating within the design capacities, the effluents have not exceeded permit limitations, and DMR data show improvements in effluent quality for both outfalls during the POR. For these reasons, the 85% removal criteria for BOD₅ and TSS will not be applied to these effluents during this permit cycle.

B. Mass-based Limitations

ARM 17.30.1345(8) requires that all effluent limits be expressed in terms of mass. The following equation was used to calculate the BOD₅ and TSS 7-day and 30-day mass-based limitations using the TBELs as proposed above and the IWS SBR design flow of 1,000 gpd:

$$\text{Load (lb/day)} = \text{Design Flow} \times \text{Concentration Limit (mg/L)} \times 8.34 \text{ (lb}\cdot\text{L)/(mg}\cdot\text{gal)}$$

BOD₅ and TSS Mass-based Load Limitations:

30-day average BOD₅ and TSS load (lb/d) = (0.001 mgd)(30 mg/L)(8.34) = 0.25 lb/d

7-day average BOD₅ and TSS load (lb/d) = (0.001 mgd)(45 mg/L)(8.34) = 0.38 lb/d

Loading limits for technology-based parameters of concern (BOD₅ and TSS) will apply to the effluent and will be maintained at the more stringent of the nondegradation allocations or mass-based loading limits calculated in this fact sheet.

C. Nondegradation Load Allocations

The provisions of ARM 17.30.701 - 718 (Nondegradation of Water Quality) apply to new or increased sources of pollution [ARM 17.30.702(18)]. Sources that are in compliance with the conditions of their permit and do not exceed the limits established in the permit or determined from a permit previously issued by the Department are not considered new or increased sources.

Nondegradation threshold values for the Madison Dam outfalls were calculated for BOD₅, TSS, total nitrogen (TN) and total phosphorus as P (TP) during issuance of the permit in 1994. The BOD₅ and TSS allocations for Outfalls 002 and 003 were based on the design flow of 0.0012 mgd and 0.0006 mgd, respectively. The 1994-derived TN and TP allocations (0.2 lb/d and 0.1 lb/d, respectively) were calculated using population equivalents of 15 and 7.5 people. The nondegradation load allocations in the renewed permit will remain at these values.

The nondegradation load allocations and the actual average loads discharged from the outfalls at this facility are presented in Tables 4 and 5, below. Actual loads for BOD₅ and TSS were obtained from the DMRs for the period of record (POR) August 2003 through September 2007. The small data set available for effluent TN and TP were obtained from the facility DMRs from September 1995 through February 1997. These data indicate that the facilities did not exceed the nondegradation load values calculated for BOD₅, TSS, TN, and TP and are not increased sources.

It is important to note that the occupancies of the houses using the two outfalls have decreased in the decade since the TN and TP data were collected. Average daily flow for Outfall 002 has decreased from 490 gpd to 20 gpd. Discharge at Outfall 003 has gone from an average daily flow of 250 gpd to 150 gpd. The 1995-1997 TN and TP data were applicable to the Biopure package treatment plants in place in 1995. These units were replaced in 1998 with the current IWS SBRs technology in use. No current TN and TP data are available with the treatment systems in use.

Table 4. Outfall 002 Nondegradation and Actual Loads for POR

Nondegradation Allocated Load Limits			Actual 30-day Average Loads (lb/day)				
Parameter	Units	Annual Average Load	<u>2003</u> TN & TP 1995	<u>2004</u> TN & TP 1996	<u>2005</u> TN & TP 1997	2006	2007
BOD ₅	lb/day	0.3	0.01	0.007	<0.001	0.0006	0.0005
TSS	lb/day	0.3	0.007	0.006	0.002	0.00006	0.0007
TN	lb/day	0.4	0.126	0.026	0.086	--	--
TP as P	lb/day	0.1	0.028	0.021	0.018	--	--

Table 5. Outfall 003 Nondegradation and Actual Loads for POR

Nondegradation Allocated Load Limits			Actual 30-day Average Loads (lb/day)				
Parameter	Units	Annual Average Load	2003 TN & TP 1995	2004 TN & TP 1996	2005 TN & TP 1997	2006	2007
BOD ₅	lb/day	0.2	0.01	0.007	<0.001	0.01	0.003
TSS	lb/day	0.2	0.01	0.008	0.015	0.014	0.005
TN	lb/day	0.2	0.008	0.024	0.036	--	--
TP as P	lb/day	0.1	0.005	0.01	0.007	--	--

D. Proposed TBELS

Table 6. Outfall 002 Proposed TBELS

Parameter	Concentration (mg/L)		Load (lb/day)	
	Weekly Average ⁽¹⁾	Monthly Average ⁽¹⁾	Weekly Average ⁽¹⁾	Monthly Average ⁽¹⁾
BOD ₅	45	30	0.38	0.25
TSS	45	30	0.38	0.25
pH, s.u	Within the range of 6.0 to 9.0 (instantaneous)			
(1) See Definition section at end of permit for explanation of terms				

Table 7. Outfall 003 Proposed TBELS

Parameter	Concentration (mg/L)		Load (lb/day)	
	Weekly Average ⁽¹⁾	Monthly Average ⁽¹⁾	Weekly Average ⁽¹⁾	Monthly Average ⁽¹⁾
BOD ₅	45	30	0.38	0.2
TSS	45	30	0.38	0.2
pH, s.u	Within the range of 6.0 to 9.0 (instantaneous)			
(1) See Definition section at end of permit for explanation of terms				

IV. Water Quality-based Effluent Limits (WQBELs)

A. Scope and Authority

The Montana Water Quality Act (Act) states that a permit may only be issued if the Department finds that the issuance or continuance of the permit will not result in pollution of any state waters [75-5-401(2), Montana Code Annotated (MCA)]. Montana water quality standards at ARM 17.30.637(2) require that no wastes may be discharged such that the waste either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. ARM 17.30.1344(1) adopts by reference 40 CFR 122.44 which states that MPDES permits shall include limits on all pollutants which will cause, or have a reasonable potential to cause an excursion of any water quality standard, including narrative standards. The purpose of this section is to provide a basis and rationale for establishing WWTP effluent limits, based on Montana water quality standards that will protect designated uses of the receiving stream.

The Act authorizes the issuance of point source discharge permits on a listed water body pending completion of a TMDL provided that: 1) the discharge is in compliance with the provisions of 75-5-303 (Nondegradation Policy), MCA; 2) the discharge will not cause a decline in water quality for the parameters for which the water body is listed; and, 3) the minimum treatment requirements under 75-5-703(10), MCA are met.

B. Receiving Water

The PPL Madison HES SBRs (Outfalls 002 and 003) discharge to the Madison River approximately two miles downstream of Ennis Lake. Outfall 002 discharges passively on the east bank to the Madison bypass reach below the dam structure and above the Powerhouse. Outfall 003 is approximately one mile upstream, discharging passively on the east bank to the slack water just 20 meters upstream of the dam proper.

The Madison River is identified as USGS Hydrologic Unit Code (HUC) 10020007 and Montana stream segment MT41F001_010. The river is classified as B-1 [ARM 17.30.610(1)(a)]. Class B-1 waters are to be maintained suitable for drinking, culinary and food processing purposes, after conventional treatment; bathing, swimming and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply [ARM 17.30.623(1)].

The 1996 303(d) list cites this segment of the Madison River as partially supportive of aquatic life support and cold water fisheries-trout and not supportive of use as a drinking water supply. Probable causes of impairment include metals from natural sources and thermal modifications due to upstream impoundment and hydromodification.

In 2006, the 303(d) list identified the river as partially supportive of aquatic life support, not supportive of cold water fisheries-trout or drinking water. It was considered to be fully supportive of agricultural and industrial uses and primary contact recreation. Probable causes include copper, lead, sedimentation/siltation, temperature, and alteration in stream-side or littoral vegetative covers. Sources were cited as agriculture, impacts from abandoned mine lands (inactive), dam construction,

upstream impoundment, impacts form hydro-structure flow, regulation/modification, and natural sources.

Outfall 002

Outfall 002 discharges to the Madison bypass reach below the dam and prior to the river return flows (see Attachment A). Article 403 of the Madison HES current 2188 Federal Energy Regulatory Commission License, issued September 27, 2000, requires that the Madison HES provide an instantaneous minimum spawning flow of 200 cfs (129 mgd) in the bypass reach from April 1 through June 30 and an instantaneous minimum (maintenance) flow of 80 cfs (51.7 mgd) in the bypass reach July 1 through March 31.

PPL MT-supported, USGS gauging station number 06040800 collects flow data for the Madison bypass reach above the powerhouse. The daily flow statistics for the period of record January 1, 2001 through September 30, 2007, show a minimum daily flow of 92 cfs experienced in the beginning of January, annually. The licensed minimum flow value of 51.7 mgd will be used as the seven day, ten year low flow condition (7Q10) flow applicable to this outfall. The resulting dilution ratio is 51,700 (51.7 mgd/0.001 mgd, the 7Q10 compared to the design discharge flow for the facility).

Outfall 003

The United States Geological Service (USGS) collects flow and other data for the Madison River at gauging station number 06041000 Madison River below Ennis Lake near McAllister, Montana. The 7Q10 for the total Madison River, at a point approximately 500 feet below the powerhouse and river return flow, is 731 cubic feet per second (cfs) or 472 mgd. This flow is assumed to be the total flow upstream of the dam. It applies to Outfall 003 which discharges to the slack water less than 20 meters upstream of the dam proper (see Attachment A). The resulting dilution ratio is 472,000.

The Montana Department of Fish, Wildlife, and Parks Montana Fisheries Information System database describes the Madison River from the dam (approximately river mile 40) to the mouth as an area of outstanding fisheries resource value for sports classifications (January 2008). The Arctic grayling, brook and rainbow trout, common carp, stonecat, mountain sucker and Utah chub are rare, year-round residents. The brown trout, longnose dace, mottled sculpin, longnose sucker, and white sucker are abundant year-round residents. The mountain whitefish is a commonly found year-round resident.

Ambient water quality data for the Madison River are minimal and were obtained from USGS gauging station 06041000 Madison River below Ennis Lake near McAllister, Montana, (July 1972 to August 2007). The data are summarized in Table 8.

Table 8. Madison River Ambient Water Quality Monitoring Data

Parameter	Units	Minimum Value	Maximum Value	Long Term Average	Number of Samples
pH, median value	s.u.	7.6	8.5	8	32
Temperature	°C	0	23	9	232
Total Ammonia as N	mg/L	--	--	--	0
Total Nitrogen	mg/L	0.15	0.77	0.37	6
Total Phosphorus as P	mg/L	0.04	0.10	0.07	6

C. Applicable Water Quality Standards

Discharges to surface waters classified B-1 are subject to the specific water quality standards of ARM 17.30.623 (March 31, 2006), Department Circular DEQ-7 (February 2006), as well as the general provision of ARM 17.30.635 through 637, 641, 645, and 646. In addition to these standards, dischargers are also subject to ARM 17.30 Subchapter 5 (Mixing Zones, November 2004) and Subchapter 7 (Nondegradation of Water Quality, June 30, 2004).

D. Mixing Zone

A mixing zone is an area where the effluent mixes with the receiving water and certain water quality standards may be exceeded [ARM 17.30.502(6)]. The Department must determine the applicability of currently granted mixing zones [ARM 17.30.505(1)]. Mixing zones allowed under a permit issued prior to April 29, 1993 will remain in effect unless there is evidence that previously allowed mixing zones will impair existing or anticipated uses [ARM 17.30.505(1)(c)].

In accordance with ARM 17.30.517(1)(b), acute water quality standards for aquatic life may not be exceeded in any portion of the mixing zone unless the Department finds that allowing minimal initial dilution will not threaten or impair existing uses. The discharge must also comply with the general prohibitions of ARM 17.30.637(1) which require that state waters, including mixing zones, must be free from substances which will:

- (b) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
- (c) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;
- (d) produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;
- (e) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and
- (f) create conditions which produce undesirable aquatic life.

No mixing zone will be granted that will impair beneficial uses [ARM 17.30.506(1)]. Aquatic life-chronic, aquatic life-acute and human health standards may not be exceeded outside of the mixing

zone [ARM 17.30.507(1)(a)]. Acute standards may not be exceeded in any part of the mixing zone [ARM 17.30.507(1)(b)].

A standard mixing zone may be granted for facilities which discharge less than one million gallons per day (MGD) or when mixing is nearly instantaneous [ARM 17.30.516(1)(d)]. Nearly instantaneous mixing is assumed if the discharge is through an effluent diffuser, when the mean daily flow exceeds the 7-day, 10-year low flow (dilution ratio <1) or the permittee demonstrates through a Department approved study plan that the discharge is nearly instantaneous. A nearly instantaneous mixing zone may not extend downstream more than two (2) river widths. The length of a standard mixing zone for other than a nearly instantaneous mixing zone, must not extend downstream more than 10 times the stream width [ARM 17.30.516(4)].

Effluent discharges which do not qualify for a standard mixing zone must apply for a source specific mixing zone in accordance with ARM 17.30.518 and must conform to the requirements of 75-5-301(4), MCA which states that mixing zones must be the smallest practicable size; have minimal effects on uses; and, have definable boundaries. ARM 17.30.515(2) states that a person applying for a mixing zone must indicate the type of mixing zone and provide sufficient detail for the Department to make a determination regarding the authorization of the mixing zone under the rules of Subchapter 5.

Outfall 002

The IWS SBR design discharge flow is less than 1.0 mgd (0.001 mgd) and the dilution ratio is greater than 100:1 (51,700); therefore, the discharge qualifies for a standard mixing zone and the Department will use the full 7Q10 dilution flow of 51.7 mgd to develop chronic effluent limitations where applicable [ARM 17.30.516(3)(a)].

Review of the administrative file shows that the previous Statement of Basis identified the mixing zone as extending downriver to a point one mile downstream from the outfall location. Mixing zones must be the smallest practicable size [75-5-301(4), MCA] and can not extend downstream more than 10 stream widths [ARM 17.30.516(4)]. The stream at the point of discharge at 7Q10 is approximately 78 feet wide (field measurements USGS 06040800). Therefore, the standard mixing zone for Outfall 002 will be defined as extending to a point 780 feet downstream of the outfall location. As this places the end of the mixing zone downstream of the river return flow point, when discharge occurs upstream of the return point, complete mixing can be assumed for this discharge.

Outfall 003

The IWS SBR design discharge flow is less than 1.0 mgd (0.001 mgd) and the dilution ratio is greater than 100:1 (472,000); therefore, the discharge qualifies for a standard mixing zone and the Department will use the full 7Q10 dilution flow of 472 mgd to develop chronic effluent limitations where applicable [ARM 17.30.516(3)(a)].

Review of the administrative file shows that the previous Statement of Basis identified the mixing zone as extending downriver to a point one mile downstream from the outfall location. Mixing zones must be the smallest practicable size [75-5-301(4), MCA] and can not extend downstream more than

10 stream widths [ARM 17.30.516(4)]. The stream at the point of discharge at 7Q10 is approximately 157 feet wide (field measurements USGS 06041000). Therefore, the standard mixing zone for Outfall 002 will be defined as extending to a point 1,570 feet downstream of the outfall location. As this places the end of the mixing zone downstream of the dam, when discharge occurs upstream of the dam, mixing can be assumed for this discharge.

E. Basis and Proposed Water Quality-based Effluent Limits

Parameters typically present in domestic wastewaters that may cause or contribute to a violation of water quality standards include the conventional pollutants such as biological material (as measured by BOD₅), suspended solids, oil & grease, pathogenic bacteria, and pH; the non-conventional pollutants such as total residual chlorine, total ammonia, total nitrogen, and total phosphorus; and the carcinogenic and toxic pollutants such as organic substances and metals.

ARM 17.30.1345 requires WQBELs to be developed for any pollutant for which there is reasonable potential (RP) for discharges to cause or contribute to exceedences of instream numeric or narrative water quality standards. RP calculations utilize the receiving water concentration, the maximum projected effluent concentration, the design flow of the wastewater treatment facility, and the applicable receiving water flow.

The Department uses a mass balance equation to determine RP (*Equation 1*).

$$C_{RP} = \frac{C_E Q_E + C_S Q_S}{Q_E + Q_S} \quad (Eq. 1)$$

Where:

C_{RP} = receiving water concentration (RWC) after mixing, mg/L
 C_E = maximum projected effluent concentration, mg/L
 C_S = RWC upstream of discharge, mg/L
 Q_S = applicable receiving water flow, mgd
 Q_E = facility design flow rate, mgd

Outfalls 002 and 003

1. Conventional Pollutants

Total Suspended Solids (TSS), Biological Oxygen Demand (BOD₅), and pH - The facility provides a significant reduction in biological material and solids through secondary treatment in the SBRs. No additional WQBELs will be required for these parameters.

Oil and Grease (O&G) - The previous permit did not limit O&G in the effluent. No monitoring for this parameter has been performed. There is a lack of information available to perform an RP assessment. Semi-annual monitoring for O&G will be conducted. No concentration limit will be implemented at this time.

***Escherichia coli* (E. coli) Bacteria** - In past permit cycles, the discharges at the PPL MT Madison HES have had no bacteria limits or monitoring requirements in effect due the large dilution flow of

the receiving water. ARM 17.30.505(2) states that if the Department determines that a mixing zone may interfere with or threaten a beneficial use, discharge limitations will be modified and if necessary, require the applicable numeric water quality criteria to be met at the end of the discharge pipe. The discharges at both Outfalls 002 and 003 are intermittent yet discharge to areas where access is unrestricted and primary or secondary recreational contact is likely. The Department is not granting a mixing zone for *E. coli* bacteria based on the following consideration; ARM 17.30.637(1)(e) which requires that state waters must be free from substances that are harmful or toxic to humans. Therefore, limitations and monitoring *E. coli* bacteria will be implemented with this permit cycle.

The permit will incorporate the Montana state standards for *E. coli* bacteria (Circular DEQ-7, February 2006). The applicable standards for *E. coli* are:

- a. April 1 through October 31, of each year, the geometric mean number of the microbial species *E. coli* must not exceed 126 colony forming units (cfu) per 100 milliliters (mL), nor are 10% of the total samples during any 30-day period to exceed 252 cfu per 100 mL (ARM 17.30.623(2)(a)(i)); and
- b. November 1 through March 31, of each year, the geometric mean number of *E. coli* shall not exceed 630 cfu per 100 mL and 10% of the samples during any 30-day period may not exceed 1,260 cfu per 100 mL (ARM 17.30.623(2)(a)(ii)).

2. Nonconventional Pollutants

Total Ammonia-N - Total ammonia-N limits are developed based on standards that account for a combination of pH and temperature of the receiving stream, the presence or absence of salmonid species, and the presence or absence of fish in early life stages. Because pH and temperature can vary greatly on a seasonal basis, as can the presence or absence of fish in early life stages, DEQ Circular DEQ-7 (February 2006) allows for the determination of ammonia standards and the resulting limits on a seasonal basis. Salmonid fishes and their early life stages are presumed present year-round.

Table 9, presents the total ammonia-N water quality standards for the Madison River using the minimal water quality data in Table 6.

Table 9. Total Ammonia-N Water Quality Standards for Receiving Water.

Condition	Period ⁽¹⁾	Salmonids Present	Early Life Stages Present	Ambient Condition		Water Quality Standard ⁽²⁾
				pH	Temperature °C	
Acute	Annual	Yes	NA	8.4 ⁽³⁾	NA	2.59
Chronic	Summer	NA	Yes	8.2 ⁽⁴⁾	17.3 ⁽⁴⁾	1.50
Chronic	Winter	NA	Yes	8.0 ⁽⁴⁾	2.4 ⁽⁴⁾	2.43
Footnotes: NA – Not Applicable (1) Winter period is taken to be November 1 through March 31; summer period is taken to be April 1 through October 31. (2) Acute - maximum daily; Chronic - 30-day average concentration. (3) Based on 95 th percentile of annual data. (4) Based on 75 th percentile of values in the applicable period.						

The minimal total ammonia as N data available for these discharges, from 1995 through 1997, is germane to treatment systems no longer in use. No total ammonia as N data has been collected for discharges from the current IWS SBRs. Therefore, RP can not be assessed for this parameter with this permit cycle. Monitoring for total ammonia as N will be included in this permit cycle for discharges from both outfalls.

Nutrients (Total Nitrogen and Total Phosphorus as P): The minimal nutrient data available for these discharges, from 1995 through 1997, is germane to treatment systems no longer in use. No TN or TP as P data have been collected for discharges from the current IWS SBRs. Therefore, RP can not be assessed for these parameters with this permit cycle. Monitoring for TN and TP as P will be included in this permit cycle for discharges from both outfalls.

Dissolved Oxygen (DO) – The Madison River is not listed as impaired for organic enrichment/DO. The PPL MT Madison HES discharges are minor point sources with substantial dilution ratios. No limit or monitoring for DO in the effluent is necessary.

Total Residual Chlorine (TRC) - The facility does not currently have chlorination capabilities. In the event chlorination is utilized on site, the effluent total residual chlorine average monthly limit will be 0.011 mg/L and the maximum daily limitation will be 0.019 mg/L at the end of pipe.

pH - Pursuant to ARM 17.30.623(2)(c), the induced variation of hydrogen ion concentration within the range of 6.5 to 8.5 must be less than 0.5 pH units. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

3. Toxic Pollutants

ARM 17.30.623(2)(h) states that concentrations of carcinogenic, bio-concentrating, toxic, or harmful parameters which would remain in the water after conventional treatment may not exceed the applicable standards specified in Department Circular DEQ-7 (February 2006).

Total Recoverable Metals – Monitoring for metals in the effluent has not been performed previously for these facilities. There is a lack of information available to perform an RP assessment. Metals are not expected to be pollutants of concern for these facilities because they treat domestic wastewater only. The discharges are minor point sources with substantial dilution ratios and no industrial contributions. No limitations or monitoring for metals are proposed for this permit cycle.

Organic Substances - Monitoring for organic substances in the effluent has not been performed previously at this facility. There is a lack of information available to perform an RP assessment. Organics are not expected to be pollutants of concern for these outfalls. The discharges are minor point sources with substantial dilution ratios and no industrial contributions. No limitations or monitoring for organic substances are proposed for this permit cycle.

Whole Effluent Toxicity (WET) Testing - ARM 17.30.637(1)(d) requires that state water be free from substances attributable to municipal waste that create condition which are harmful or toxic to human, animal, plant or aquatic life, except the Department may allow limited toxicity in a mixing zone provided that there is no acuter lethality to organisms. The discharges are minor point sources with substantial dilution ratios and no industrial contributions; toxicity is unlikely in the mixing zone. No WET testing will be required with this permit cycle.

V. Proposed Final Effluent Limitations

Outfall 002

Interim Limitations

The following final effluent limitations will be applied to the discharge at Outfall 002, effective immediately and remain in effect through midnight December 31, 2012.

Table 10. Outfall 002 Interim Limitations

Parameter	Units	Average Monthly Limit ⁽¹⁾	Average Weekly Limit ⁽¹⁾	Maximum Daily Limit ⁽¹⁾
BOD ₅	mg/L	30	45	--
	lb/day	0.25	0.38	--
TSS	mg/L	30	45	--
	lb/day	0.25	0.38	--
Total Residual Chlorine ⁽²⁾	mg/L	0.011	--	0.019
Footnotes:				
(1) See Definition section at end of permit for explanation of terms.				
(2) The permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is <i>not</i> used, write "NA" on the DMR for this parameter.				

pH: Effluent pH from Outfall 002 shall remain between 6.0 and 9.0 standard units (instantaneous minimum and instantaneous maximum). For compliance purposes, any single analysis or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge which causes visible oil sheen in the receiving stream.

Final Limitations

The following final effluent limitations will be applied to the discharge at Outfall 002, effective January 1, 2013 and will remain in effect for the duration of the permit cycle.

Table 11. Outfall 002 Final Limitations

Parameter	Units	Average Monthly Limit ⁽¹⁾	Average Weekly Limit ⁽¹⁾	Maximum Daily Limit ⁽¹⁾
BOD ₅	mg/L	30	45	--
	lb/day	0.25	0.38	--
TSS	mg/L	30	45	--
	lb/day	0.25	0.38	--
<i>E. coli</i> Bacteria ^(2, 3)	cfu/100 mL	126	--	252
<i>E. coli</i> Bacteria ^(3, 4)	cfu/100 mL	630	--	1,260
Total Residual Chlorine ⁽⁵⁾	mg/L	0.011	--	0.019
Footnotes: (1) See Definition section at end of permit for explanation of terms. (2) This limit applies during the period April 1 through October 31. (3) Report Geometric Mean if more than one sample is collected during reporting period. (4) This limit applies during the period November 1 through March 31. (5) The permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is <i>not</i> used, write "NA" on the DMR for this parameter.				

pH: Effluent pH from Outfall 002 shall remain between 6.0 and 9.0 standard units (instantaneous minimum and instantaneous maximum). For compliance purposes, any single analysis or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge which causes visible oil sheen in the receiving stream.

Outfall 003

Interim Limitations

The following final effluent limitations will be applied to the discharge at Outfall 003, effective immediately and remain in effect through midnight December 31, 2012.

Table 12. Outfall 003 Interim Limitations

Parameter	Units	Average Monthly Limit ⁽¹⁾	Average Weekly Limit ⁽¹⁾	Maximum Daily Limit ⁽¹⁾
BOD ₅	mg/L	30	45	--
	lb/day	0.2	0.38	--
TSS	mg/L	30	45	--
	lb/day	0.2	0.38	--
Total Residual Chlorine ⁽²⁾	mg/L	0.011	--	0.019
Footnotes: (1) See Definition section at end of permit for explanation of terms. (2) The permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is <i>not</i> used, write "NA" on the DMR for this parameter.				

pH: Effluent pH from Outfall 003 shall remain between 6.0 and 9.0 standard units (instantaneous minimum and instantaneous maximum). For compliance purposes, any single analysis or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge which causes visible oil sheen in the receiving stream.

Final Limitations

The following final effluent limitations will be applied to the discharge at Outfall 003, effective January 1, 2013 and will remain in effect for the duration of the permit cycle.

Table 13. Outfall 003 Final Limitations

Parameter	Units	Average Monthly Limit ⁽¹⁾	Average Weekly Limit ⁽¹⁾	Maximum Daily Limit ⁽¹⁾
BOD ₅	mg/L	30	45	--
	lb/day	0.2	0.38	--
TSS	mg/L	30	45	--
	lb/day	0.2	0.38	--
<i>E. coli</i> Bacteria ^(2, 3)	cfu/100 mL	126	--	252
<i>E. coli</i> Bacteria ^(3, 4)	cfu/100 mL	630	--	1,260
Total Residual Chlorine ⁽⁵⁾	mg/L	0.011	--	0.019
Footnotes: (1) See Definition section at end of permit for explanation of terms. (2) This limit applies during the period April 1 through October 31. (3) Report Geometric Mean if more than one sample is collected during reporting period. (4) This limit applies during the period November 1 through March 31. (5) The permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is <i>not</i> used, write "NA" on the DMR for this parameter.				

pH: Effluent pH from Outfall 003 shall remain between 6.0 and 9.0 standard units (instantaneous minimum and instantaneous maximum). For compliance purposes, any single analysis or measurement beyond this limitation shall be considered a violation of the conditions of this permit.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

There shall be no discharge which causes visible oil sheen in the receiving stream.

V. Self-Monitoring Requirements

Starting with the effective date of the permit and lasting for the duration of the permit cycle, self-monitoring of effluent discharged at Outfalls 002 and 003 shall be conducted at the end of pipe from the each of the SBR discharge points. To assess compliance with 7-day and 30-day limitations some parameters will be sampled on a weekly basis as indicated in Table 14, below.

Table 14. Outfalls 002 and 003 PPL MT, Madison HES Effluent Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type ⁽¹⁾
Flow ⁽²⁾	gpd	Effluent	Daily	⁽²⁾
5-Day Biological Oxygen Demand (BOD ₅)	mg/L	Effluent	1/Week	Grab
	lb/day	Effluent	1/Month	Calculated
Total Suspended Solids (TSS)	mg/L	Effluent	1/Week	Grab
	lb/day	Effluent	1/Month	Calculated
pH	s.u.	Effluent	1/Week	Instantaneous
Temperature	°C	Effluent	1/Week	Instantaneous
Total Residual Chlorine ⁽³⁾	mg/L	Effluent	Daily	Grab
Total Ammonia as N	mg/L	Effluent	1/Month	Grab
Nitrate + Nitrite as N	mg/L	Effluent	1/Month	Grab
Total Kjeldahl Nitrogen	mg/L	Effluent	1/Month	Grab
Total Nitrogen as N ⁽⁴⁾	mg/L	NA	1/Month	Calculated
	lb/day	NA	1/Month	Calculated
Total Phosphorus as P	mg/L	Effluent	1/Month	Grab
	lb/day	NA	1/Month	Calculated
Oil & Grease ⁽⁵⁾	mg/L	Effluent	Semi-Annual	Grab

Footnotes:

- (1) See Definitions section at end of permit for explanation of terms.
- (2) Requires continuous flow monitoring and recording/totalizing devices effective January 1, 2010. Permittee shall report daily maximum and daily average flow on DMR.
- (3) The permittee is only required to sample for total residual chlorine if chlorine is used as a disinfectant in the treatment process. If chlorine is *not* used, write "NA" on the DMR for this parameter.
- (4) Calculated as the sum of Nitrate + Nitrite as N and Total Kjeldahl Nitrogen concentrations.
- (5) Use EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM), or equivalent.

VI. Nonsignificance Determination

The proposed effluent limits and discharge flows for the PPL MT Madison HES facilities do not constitute new or increased sources of pollutants pursuant to ARM 17.30.702(16). Therefore, a nonsignificance analysis is not required [ARM 17.30.705(1)].

VII. Special Conditions

Outfalls 002 and 003 have no flow monitoring capabilities installed at this time. The permittee's water systems contractor uses telemetry information regarding discharge pump starts in a 24-hour period and volumetric calculations to determine daily flows at each outfall. The permittee does not currently have continuous flow monitoring, recording, or totalizing capability on Outfalls 002 or 003. A special condition will be included in the permit allowing the permittee to plan and install secondary continuous flow monitoring and recording/totalizing capabilities by midnight, December 31, 2010.

VIII. Other Information

On September 21, 2000, a US District Judge issued an order stating that until all necessary total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act are established for a particular water quality limited segment, the State is not to issue any new permits or increase permitted discharges under the MPDES program. The order was issued under the lawsuit Friends of the Wild Swan vs. US EPA, et al., CV 97-35-M-DWM, District of Montana, Missoula Division.

The renewal of this permit does not conflict with Judge Molloy's order because the permitted discharges do not represent new or increased sources of pollutants under the MPDES program.

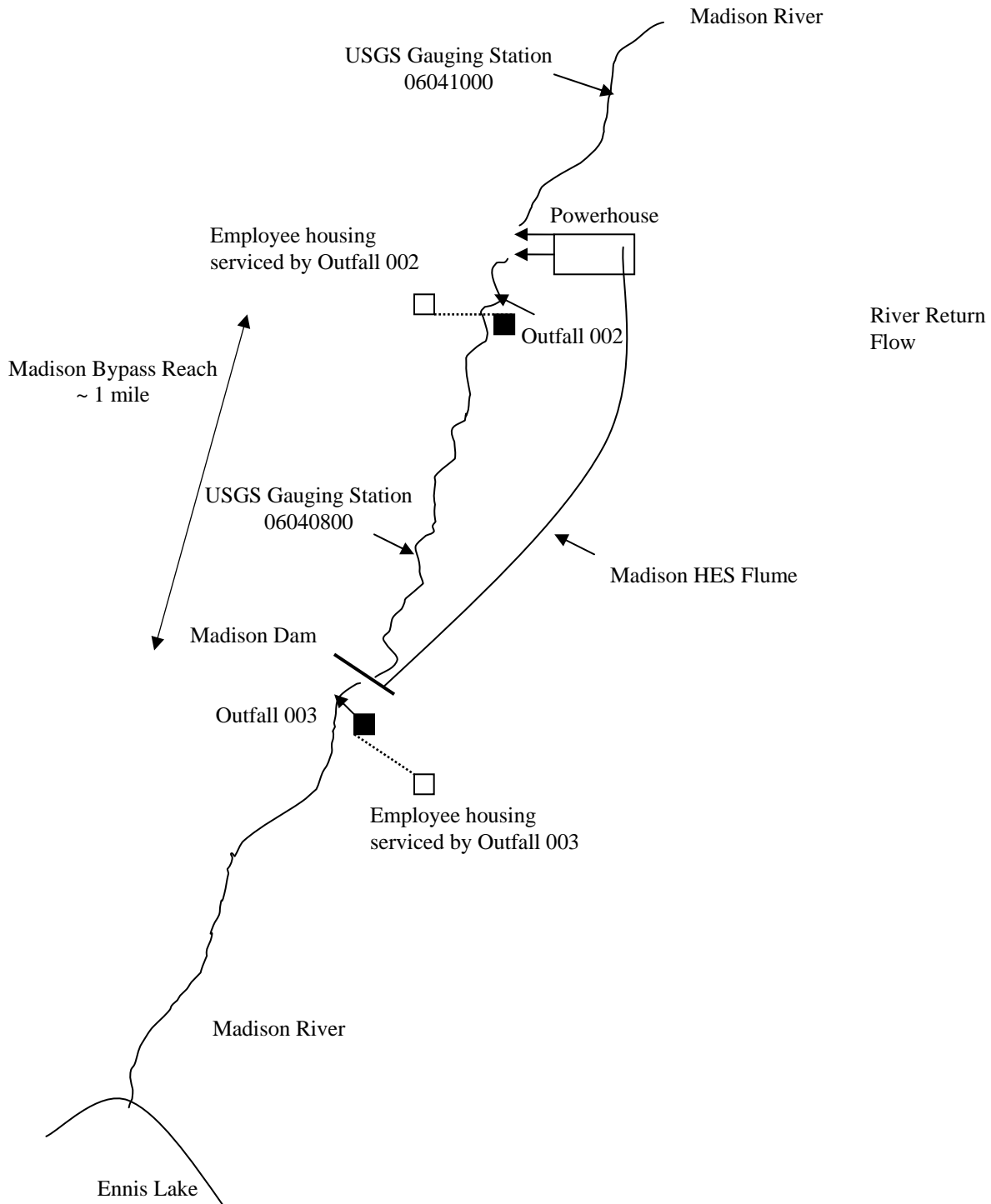
IX. Information Sources

1. Administrative Rules of Montana Title 17 Chapter 30 - Water Quality
 - a. Sub-Chapter 2 - Water Quality Permit and Application Fees, November 2003.
 - b. Sub-Chapter 5 - Mixing Zones in Surface and Ground Water, November 2004.
 - c. Sub-Chapter 6 - Montana Surface Water Quality Standards and Procedures, September 2004.
 - d. Sub-Chapter 7- Nondegradation of Water Quality, November 2004.
 - e. Sub-Chapter 10 - Montana Ground Water Pollution Control System, September 2004.
 - f. Sub-Chapter 11 - Storm Water Discharges,
 - g. Sub-Chapter 12 - Montana Pollutant Discharge Elimination System (MPDES) Standards, March 2003.
 - h. Sub-Chapter 13 - Montana Pollutant Discharge Elimination System (MPDES) Permits, March 2003.
2. Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. §§ 1251-1387, October 18, 1972, as amended 1973-1983, 1987, 1988, 1990-1992, 1994, 1995 and 1996.

3. Clean Water Act § 303(d), 33 USC 1313(d) Montana List of Waterbodies in Need of Total Maximum Daily Load Development, 1996 and 2006.
4. Montana Code Annotated Title 75 - Environmental Protection Chapter 5 - Water Quality, October 2005.
5. Montana Department of Environmental Quality Circular DEQ-2, Design Standards for Wastewater Facilities, September 1999.
6. Montana Department of Environmental Quality Circular DEQ-7, Montana Numeric Water Quality Standards, February 2006.
7. Montana Department of Fish Wildlife and Parks D. Skaar, Spawning Times of Montana Fishes, March 2001.
8. Montana Pollutant Discharge Elimination System (MPDES) Permit Number MT0023167:
 - a. Administrative Record
 - b. Renewal Application Forms DEQ-1 and 2E, November 2007
9. US Code of Federal Regulations, 40 CFR Parts 122-125, 130-133, & 136.
10. US Code of Federal Regulations, 40 CFR Part 403 – General Pretreatment Regulations for Existing and New Sources of Pollution.
11. US Code of Federal Regulations, 40 CFR Part 503 – Standards for the Use or Disposal of Sewage Sludge.
12. US Department of the Interior US Geological Survey, Statistical Summaries of Streamflow in Montana and Adjacent Areas, Water Years 1900 through 2002, Scientific Investigations Report 2004-5266, 2004.
13. US Environmental Protection Agency (EPA) Technical Support Document for Water Quality-Based Toxics Control, EPA/505/2-30-001, March 1991.
14. US EPA NPDES Permit Writers' Manual, EPA 833-B-96-003, December 1996.
15. US EPA Region VIII NPDES Whole Effluent Toxics Control Program, August 1997.
16. US EPA NPDES Permit Writers' Course Manual, EPA-833-B-91-001, April 2003.
17. US Federal Energy Regulatory Commission, Article 403 of FERC License 02188, issued September 27, 2000.

Completed March 27, 2008 MK Valett

Attachment A.
PPL MT Madison HES



■ SBR
..... SBR Influent Flow

